



Brief Status Report

US ATLAS Phase I Upgrade Project

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Project Manager
Brookhaven National Laboratory

Laboratory Coordination Group Meeting
December 20, 2013



Outline

- ❖ Overall status
- ❖ Timeline to CD-2/3
- ❖ Changes to CERN shutdown schedule
- ❖ TDR status



Agency Financial Guidance

❖ DOE:

	Fiscal Year	FY13	FY14	FY15	FY16	FY17	TOTAL
CD-0 (August 29, 2012)	Other Project Costs (OPC)	2.0	3.0				5.0
CD-0	Total Estimated Cost (TEC)	0	0	8.5	11.0	9.5	29.0
CD-0	Total Project Cost (TPC, \$M)	2.0	3.0	8.5	11.0	9.5	34.0
Updated Guidance (President's Budget, April 10, 2013)	Total Project Cost (TPC, \$M)	1.5	6.0	7.75	9.5	8.5	33.25

❖ NSF: proposal for \$12.8M submitted June 6, 2013.

- Current NSF guidance is a flat funding distribution, undergoing further consideration by the agency.

❖ Project has received \$1.5M (FY13) + \$2.5M (FY14) = \$4.0M total to date, all from DOE.



Global Status

❖ DOE

- CD-1 approved by DOE October 17, 2013.
- For CD-2/3 (combined) review, the Project, DOE OHEP & OPA have agreed to:
 - Director's Review the week of June 23, 2014 (BNL/Stony Brook).
 - DOE CD-2/3 Review the week of September 15, 2014 (BNL).

❖ NSF

- Mail in (*ad hoc*) reviews of proposal complete.
- Panel review scheduled for January 21, 2014.
 - Will cover management only, no science or technical.
 - Forward funding awaits formal agency approval, which is anticipated quickly thereafter.



Project Organization

Includes changes
incorporated
since CD-1.

BNL Associate Laboratory Director

B. Mueller, ALD for NPP
D. Lissauer, Deputy

Project Office

J. Kotcher (BNL), Project Manager (PM)
C. Bee (Stony Brook), Deputy PM
J. Hobbs (Stony Brook), NSF Principal Investigator (PI)
ES&H Liaison - R. Gill (BNL)
QA Liaison - J. Eng (BNL)
Project Controls - C. Butehorn (BNL); X. Guo (BNL)
Project Administration - C. Kelly (Stony Brook); W. Yu (BNL)

BNL/Stony Brook
integrated management.
DOE- and NSF-funded
deliverables treated on
equal footing.

WBS 1.1

LAr Cal Trigger Readout (LAr)
G. Brooijmans (Columbia)
J. Hobbs (Stony Brook), Deputy

1.1.1 Baseplanes
J. Rutherford (Arizona)

1.1.2 Layer Sum Boards (LSB)
J. Mueller (Pittsburgh)

1.1.3 LAr Trigger Digitizer Boards
(LTDB)
M.A. Pleier (BNL)

1.1.4 LAr Digital Processing System
(LDPS)
S. Majewski (Oregon)

1.1.5 LAr Level 2 Project Management
G. Brooijmans (Columbia)

WBS 1.2

Muon New Small Wheel (nSW)
J. Bensinger (Brandeis)
V. Polychronakos (BNL), Deputy

1.2.1 Micromegas (MM) Electronics
K. Johns (Arizona)

1.2.2 Alignment
C. Blocker (Brandeis)

1.2.3 Thin Gap Chambers (sTGC)
Electronics
J. Zhu (Michigan)

1.2.4 nSW Level 2 Project Management
J. Bensinger (Brandeis)

WBS 1.3

Trigger/Data Acquisition (TDAQ)
C. Bee (Stony Brook)
H. Evans (Indiana), Deputy

1.3.1 Readout Driver (ROD) & Algorithm
Firmware
H. Chen (BNL)

1.3.2 FEX (Feature Extractor)
ATCA Hub
W. Fisher (Michigan State)

1.3.3 e/FEX Fiber Plant
R. Schwienhorst (Michigan State)

1.3.4 TDAQ Level 2 Project Management
C. Bee (Stony Brook)

WBS 1.4

Project Management
J. Kotcher (BNL)
Deputy, TBD



Target Timeline to CD-2/3

Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14
	Internal Proj Rev		Internal Mini-Rev		CD-2/3 Dir Rev		CD-2/3 DOE Rev	
	Earned Value Management System (EVMS) Monthly Reporting & Debug			EVMS Final Monthly Output for CD-2/3				
Freeze Initial P6 Baseline	Final Development of P6/RLS & Project Material, Freeze for Final EVMS and Review			Dir Rev: P6/RLS & Project Material Frozen, Posted	DOE Rev: P6/RLS Frozen	DOE Rev: All Project Material Frozen, Posted		
Site Visit 1		Site Visit 2		Site Visit 3				

Resource loaded schedule undergoing final development, will be frozen in January 2014 in preparation for CD-2/3.



Updated CERN Shutdown Schedule

- ❖ CERN announced a change in the LHC shutdown schedule(s) on December 3, 2013.
 - Long Shutdown 2 (LS2), Phase I installation:
 - Previously: end-CY17 through end-CY18 (one year duration).
 - New: mid-CY18 through end-CY19 (six months delay, 1.5 years duration)
 - LS3 (Phase II installation, etc.) now 30 months in duration beginning in 2023.
- ❖ US Phase I project plan is, by design, independent of the CERN shutdown schedule.
- ❖ US deliverables will be shipped to CERN and ready to install & commission by end-CY17, regardless of shutdown schedule.



ATLAS Phase I Technical Design Reports

- ❖ nSW and FTK TDRs endorsed by LHCC in September 2013.
- ❖ LAr and TDAQ TDRs endorsed by LHCC in December 2013.
- ❖ Costing in TDRs is being scrutinized by the Resource Review Board (RRB) Upgrade Cost Group.
 - Process will be completed in early February.
- ❖ All ATLAS MoUs are in preparation.



Backup Slides



LHC ATLAS Detector Upgrade Project, by WBS

❖ 1.1 Liquid Argon Calorimeter Trigger Readout (LAr)

- 1.1.1 Baseplanes
- 1.1.2 Layer Sum Boards (LSB)
- 1.1.3 Liquid Argon Trigger Digitizer Boards (LTDB)
- 1.1.4 Back-End Electronics

Green = DOE-only,
Purple = DOE & NSF

❖ 1.2 Muon New Small Wheel (nSW)

- 1.2.1 Micromegas (MM) Electronics
- 1.2.2 Alignment
- 1.2.3 Small-Strip Thin Gap Chamber (sTGC) Electronics

nSW is funded by DOE only.
Funding for LAr and TDAQ is
split between DOE & NSF.

❖ 1.3 Trigger/Data Acquisition (TDAQ)

- 1.3.1 Readout Driver (ROD) and Algorithm Firmware
- 1.3.2 FEX ATCA Hub
- 1.3.3 e/jFEX Fiber Plant

❖ 1.4 Project Management

Deliverables are uniquely assigned to NSF or DOE.
Proposed scope for each agency carefully crafted.



LHC ATLAS-U Institutions

University of Arizona

Boston University

Brandeis University

Brookhaven National Laboratory

University of California, Irvine

Columbia University

Harvard University

Indiana University

University of Illinois, Urbana Champaign

Massachusetts Institute of Technology

University of Michigan

Michigan State University

University of Oregon

University of Pennsylvania

University of Pittsburgh

Southern Methodist University

Stanford Linear Accelerator Laboratory

Stony Brook University

16 Universities + 2 National Laboratories

Key: LAr, nSW, TDAQ, LAr + nSW, LAr + TDAQ, LAr + nSW + TDAQ



Major Milestones, Project Target Dates

- ❖ Aug 29, 2011 – DOE CD-0 approval for the upgrade.
- ❖ Dec 14, 2012 – First draft of WBS, including funding sources for all deliverables.
- ❖ Dec 19-20 – Internal scrubbing with project personnel and US ATLAS management at BNL.
- ❖ Jan 11, 2013 – Draft of Conceptual Design Report; draft of NSF upgrade proposal; fully loaded WBS, with backup material; due in to upper management.
- ❖ Jan 17-18 – Independent cost, schedule and technical review by external reviewers held at SUNY Stony Brook.
- ❖ Jan 30-31 – BNL Associate Laboratory Director's (ALD) review of operations and upgrade. Preparation for March 6-7, 2013 joint NSF/DOE review.
- ❖ Feb 8 – Final project material in place prior to uploading into MS Project/Primavera.
- ❖ **March 6-7 – NSF/DOE annual review.**
- ❖ March-June – Individual scrubbing meetings with project personnel: BoEs, cost, schedule.
- ❖ **April 3 – NSF/DOE Joint Oversight Group (JOG) Meeting.**
- ❖ **June 6 – NSF proposal submitted.**
- ❖ **July 11-12 – BNL ALD review of DOE CD-1 for upgrade.**
- ❖ July 25-26 – First Cost Account Manager (CAM) training at BNL for LHC ATLAS-U CAMs.
- ❖ **August 28-29 – DOE CD-1 review.**
- ❖ **October 17, 2013 – CD-1 approval obtained.**



Planning Documents for DOE CD-1/NSF Proposal Submission & Review

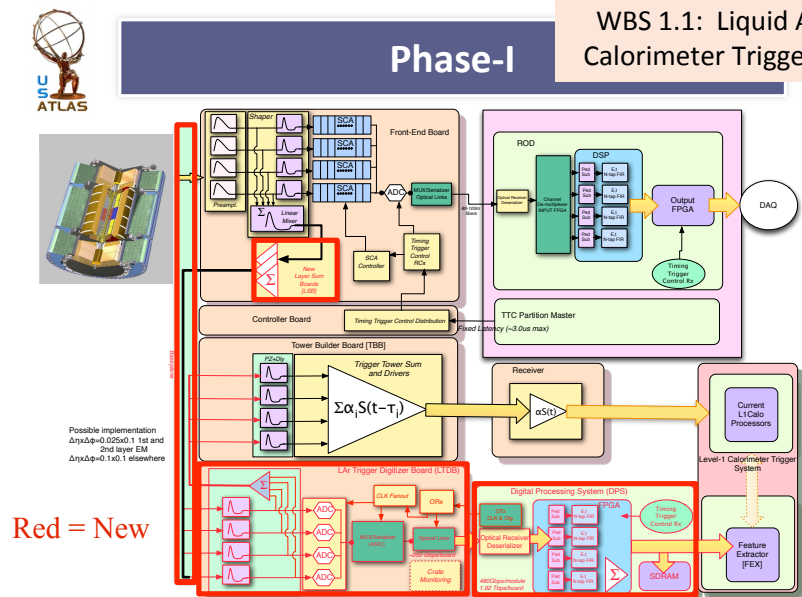
- ❖ Conceptual Design Report (CDR)
- ❖ Project Execution Plan (PEP)
- ❖ Integrated Project Team (IPT) Charter
- ❖ Acquisition Strategy
- ❖ Project Management Plan (PMP)
- ❖ Risk Management Plan
- ❖ Environment, Safety and Health (ES&H) Plan
- ❖ Hazard Analysis
- ❖ Quality Assurance (QA) Plan
- ❖ Security and Vulnerability Assessment
- ❖ National Environmental Policy Act (NEPA) Compliance
- ❖ Alternatives Analysis (part of CDR)
- ❖ Configuration Management Plan
- ❖ Assumptions Document
- ❖ Cost, schedule, staffing estimates
- ❖ Bottom-up risk-based contingency estimates
- ❖ Cost Books, Bases of Estimate (BOE)
- ❖ MoUs

All required documents
were signed (where
relevant) and posted for the
DOE CD-1 review.

LHC ATLAS-U Subprojects

Phase-I

WBS 1.1: Liquid Argon Calorimeter Trigger (LAR)

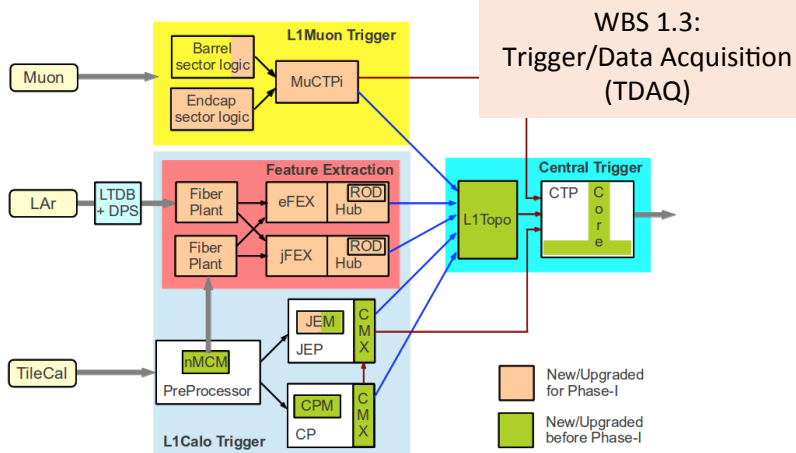


Gustaaf Broiljman, LAR, WBS 1.1

LHC ATLAS-U BNL Director's Review for CD-1, July 11-12, 2013

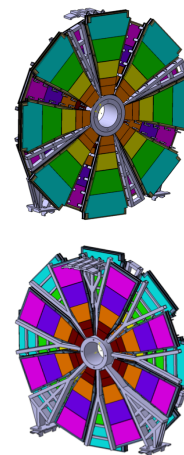
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Level 1 Trigger in Phase 1

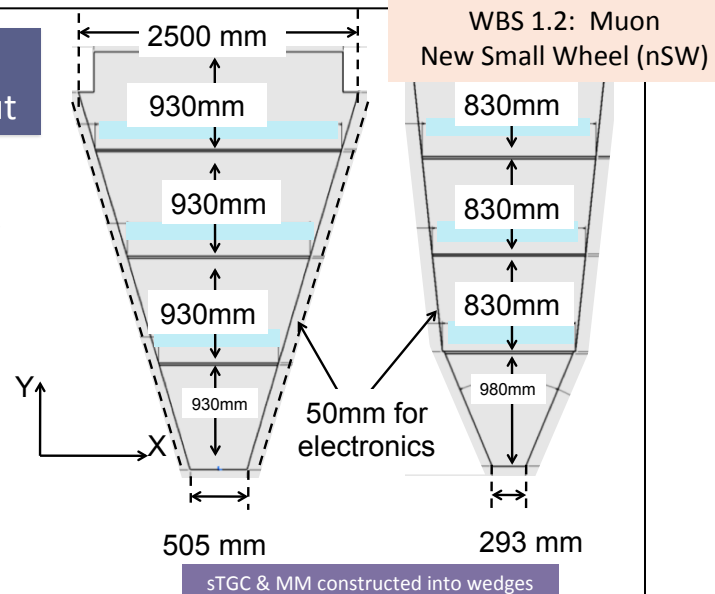


LHC ATLAS-U BNL Director's Review for CD-1, July 11-12, 2013

nSW Layout



30-31 January 2013



U.S. ATLAS Operations Program Director's Review

1

❖ US Focus:

- Increased granularity and functionality in the Liquid Argon Calorimeter Level 1 trigger.
- Forward Muon (New Small Wheel) front-end readout, trigger, and alignment systems.
- Integration of calorimeter information for use in topological and other triggering (TDAQ).



DOE CD-1 Review

- ❖ DOE CD-1 Review held on August 28-29, 2013 at Fermilab.
- ❖ From Executive Summary, final report (October 1, 2013):

The Committee found that the ATLAS Upgrade project design is sufficiently advanced to provide a good basis for establishing the cost and schedule range. The ATLAS project team has extensive management experience and is capable of producing technical, cost and schedule baselines. The Committee noted that the project scope and specifications are advanced to or beyond CD-1 maturity to adequately support the preliminary cost and schedule estimates.

The Committee recommended that the project proceed to CD-1 after addressing the review recommendations.

- ❖ All recommendations were immediately addressed (straightforward).
- ❖ DOE Energy Systems Acquisition Advisory Board (ESAAB) approved CD-1 on October 17, 2013.



DOE Level 1 & 2 Milestones (from PPEP)

Level 1 Milestone	Level 1 Milestone Title	Schedule Date
CD-0	Approve Mission Need	8/29/2012 (A)
CD-1	Approve Alternative Selection and Cost Range	10/17/2013 (A)
CD-2	Approve Performance Baseline	Q1 FY 2015
CD-3	Approve Start of Construction	Q1 FY 2015
CD-4	Approve Project Completion	Q4 FY 2019

Level 1
Milestones

No construction
start prior to
FY15 (DOE).

Level 2
Milestones

Level 2 Milestone	Schedule Date
nSW Decision on Functionality of the TDS Chip	Q1 FY 2014
TDAQ Fiber Plant Engineering Design Specifications Finalized	Q2 FY 2015
nSW Front End Chip Final Design Review/Production Readiness Review (PRR)	Q4 FY 2015
nSW ROD Testing of Complete Chain with Production Components	Q2 FY 2016
LAr LTDB Integration & Assembly Begins	Q2 FY 2017
LAr Analog Mezzanine Boards Production Complete	Q2 FY 2017
nSW MicroMegas Front End Board Ready to Install	Q3 FY 2017
TDAQ all FEX ATCA Hub Firmware Finalized	Q1 FY 2018
LAr LTDB Integration & Assembly Complete	Q1 FY 2018

Project is targeting simultaneous CD-2/3 review in August 2013.



Project Activities Since CD-1

- ❖ Maintain technical progress.
- ❖ Focus on generating a final, detailed, CD-2- quality (“baselinable”) resource loaded schedule (RLS) in Primavera.
 - Bottom up, include anything missed on initial go around, more granularity, etc.
 - Project timeline developed, which targets CD-2/3 in August 2013.
 - RLS is principal basis for future approval decisions.
- ❖ Identify and train Cost Account Managers (CAMs).
 - Track schedule/cost status, earned value management, variance analyses.
 - Includes all (10) Level 3 managers, plus a few additional technical personnel.
- ❖ In-person sessions at BNL held by Level 2 managers for schedule development. Continue weekly meetings.
- ❖ Bi-weekly meetings with DOE, (NSF), Federal Project Director.
- ❖ Near-term adaptations to uncertainties in Washington.